

## Why Were Some La Niñas Followed by Another La Niña?

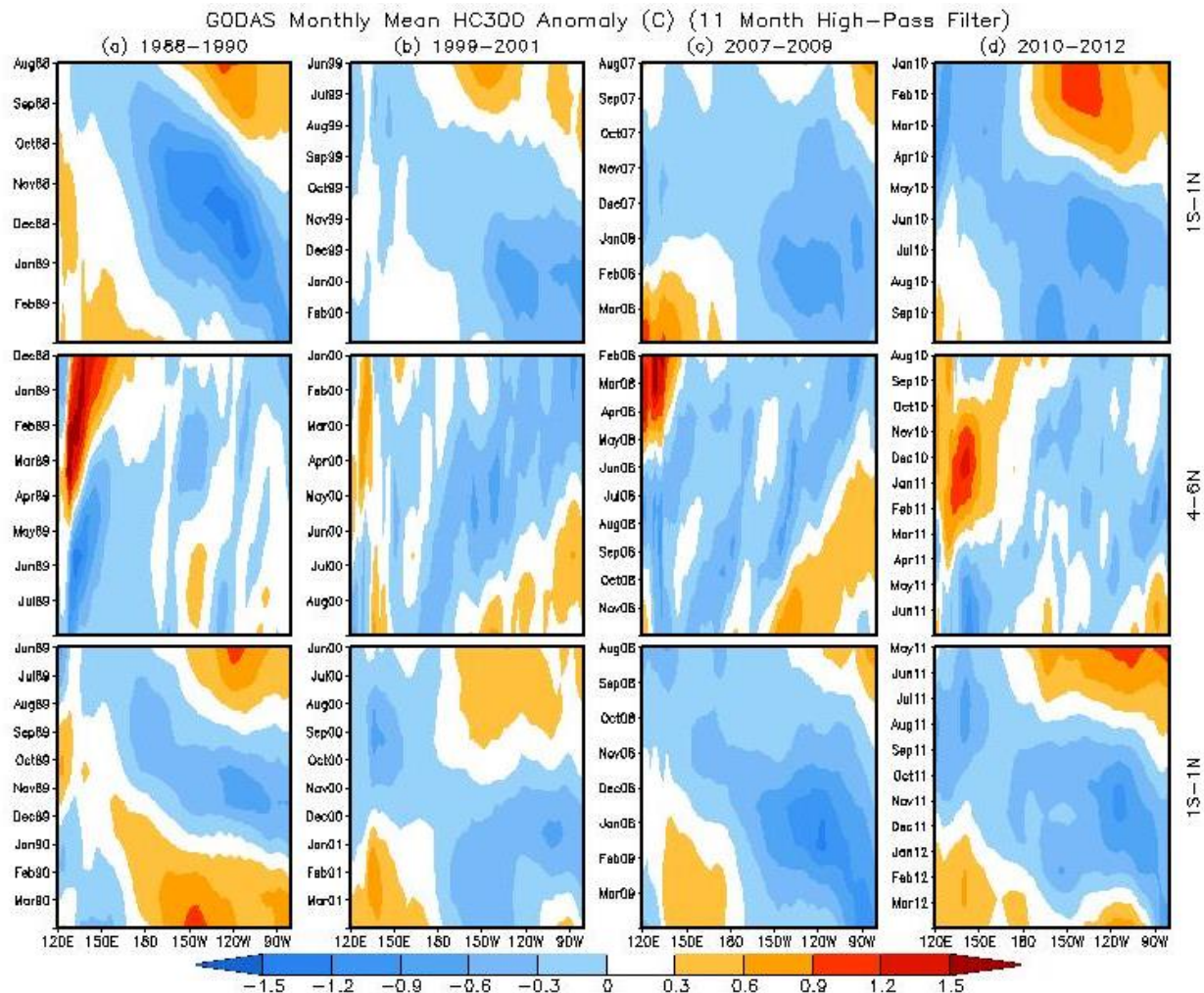
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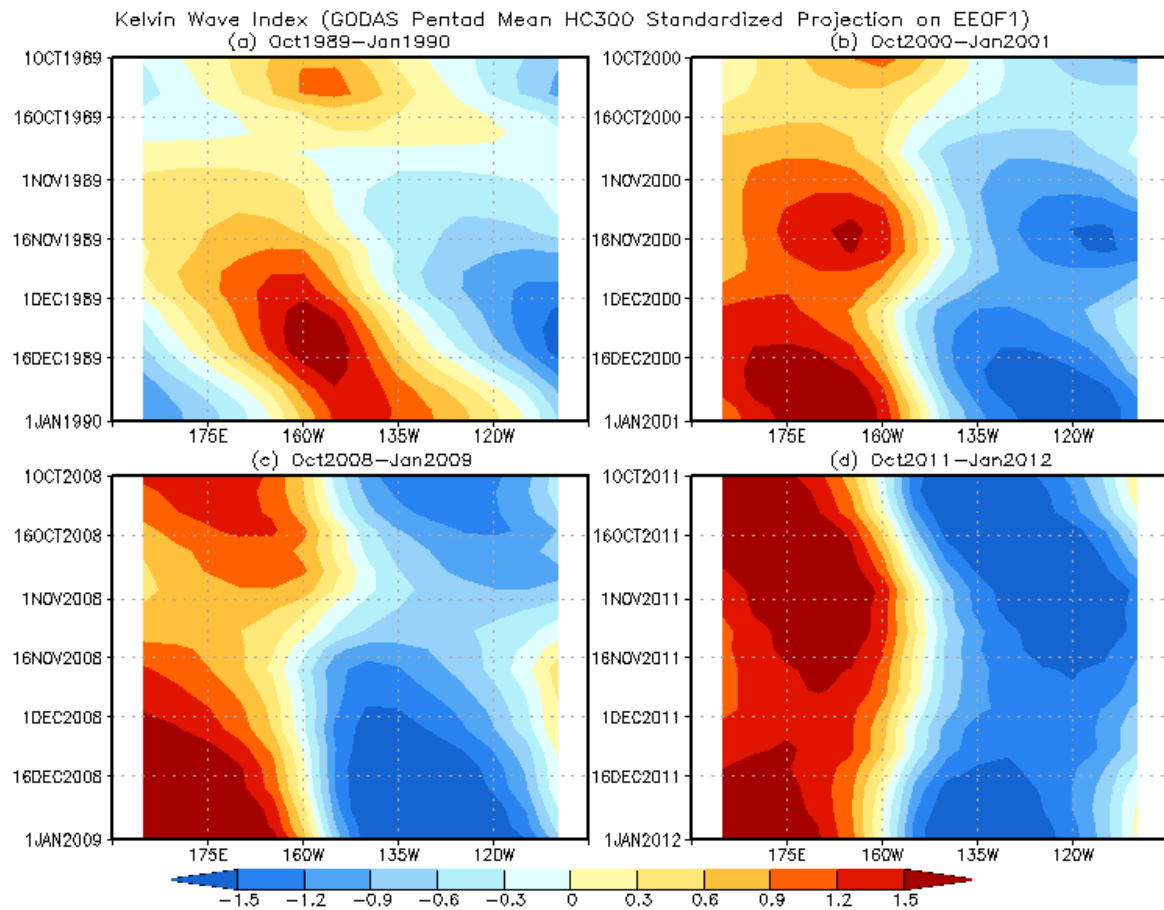
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### ABSTRACT

This paper investigates why some La Niña events are followed by another La Niña and some others are not. We propose two preconditions that result in continuation of a La Niña. The first one is that La Niña must be a strong event (a major La Niña). This ensures that the reflected Rossby wave signal at the eastern boundary of the Pacific has a strong westward propagating cold ocean temperature anomaly over the off-



**Fig. 1** Monthly mean HC300 anomalies averaged in 1°S-1°N (top and bottom panels) and in 4-6°N (middle panel) in the Pacific during (a) 1988-90, (b) 1999-2001, (c) 2007-09, and (d) 2010-12. An 11 month high-pass filter is applied to suppress the interannual and longer time scale variations.



**Fig. 2** Standardized projection of pentad mean OTAs along the equator onto 1<sup>st</sup> mode of EEOF in (a) Oct 1989–Jan 1990, (b) Oct 2000–Jan 2001, (c) Oct 2008–Jan 2009, and (d) Oct 2011–Jan 2012. X-axis represents the longitude location of maximum positive loading in the 14 contiguous pentad OTAs of 1<sup>st</sup> EEOF. See Seo and Xue (2005) for the details of the EEOF calculation.

equatorial region (Fig. 1). The off-equator cold anomaly may not be conducive to the equatorial recharge process, and as a result, may favor the persistence of cold ocean subsurface temperature anomaly and prevent the transition from La Niña to El Niño.

The second precondition is whether there are eastward propagating downwelling Kelvin waves during the decay phase of a major La Niña (Fig. 2). Eastward propagating downwelling Kelvin waves could lead to demise for a tendency for a follow-up La Niña. The equatorial Kelvin wave activities are associated with fluctuations of surface wind in the equatorial far-western Pacific. The analysis suggests that both the surface wind in the equatorial far-western Pacific and the recharge/discharge of the equatorial Pacific are indicators for occurrence or no occurrence of a follow-up La Niña event.

This work has been published in *Climate Dynamics* in 2014.

## References

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- Seo, K., and Y. Xue, 2005: MJO-related oceanic Kelvin waves and the ENSO cycle: A study with the NCEP Global Ocean Data Assimilation System. *Geophys. Res. Lett.*, **32**, doi: 10.1029/2005GL022511. ISSN: 0094-8276.